Keeping Water Local

Living Within Your Hydrologic Budget Makes Sense

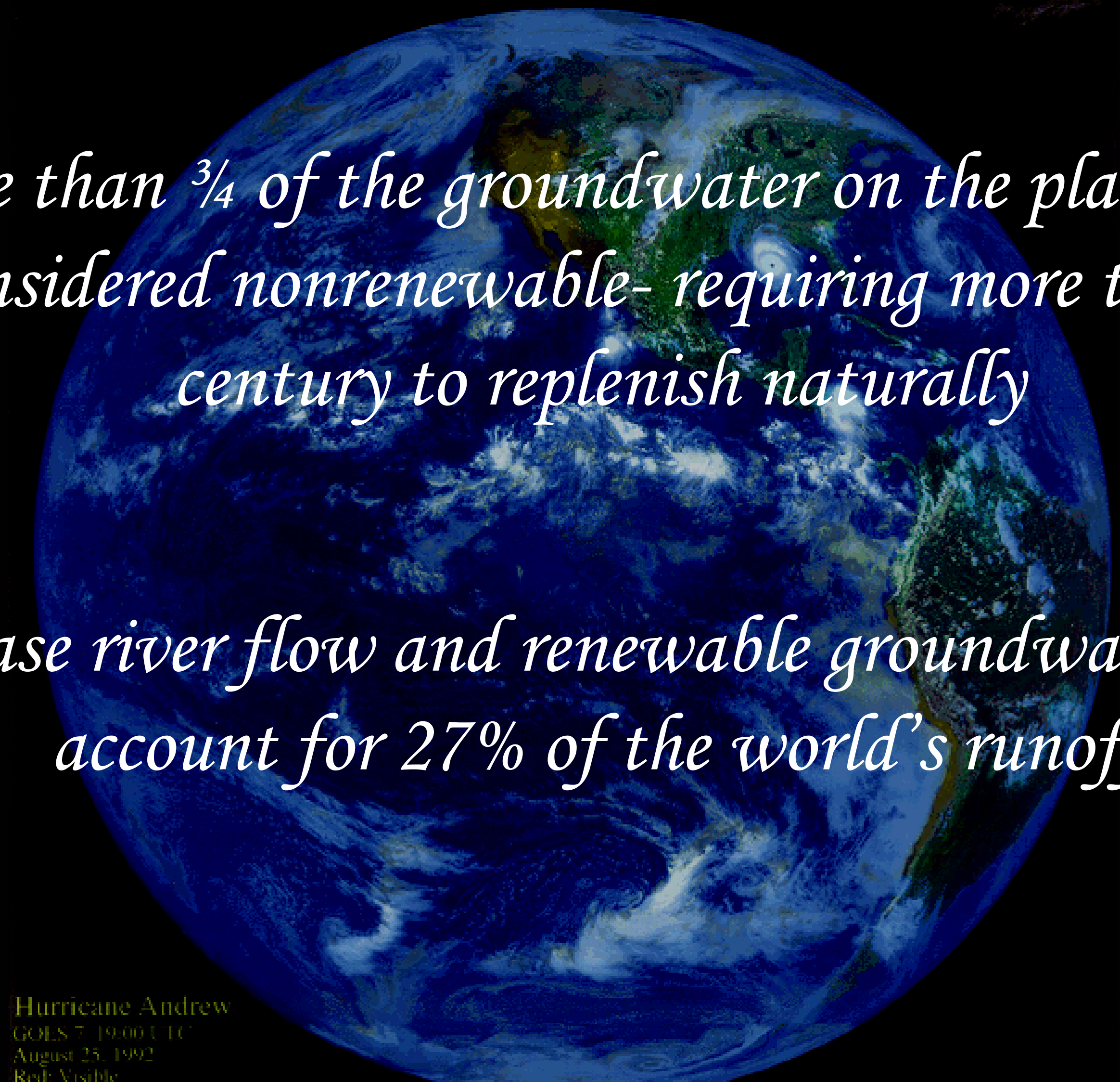
RIVERWAYS PROGRAM

Margaret Kearns & Cindy Delpapa

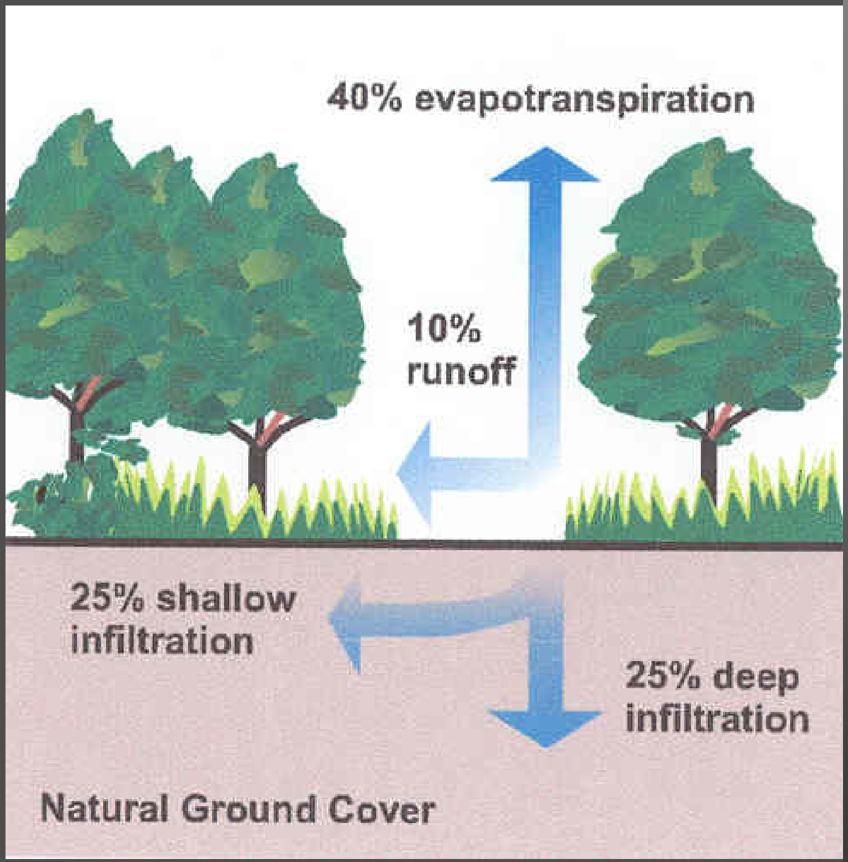
Renewable Resources

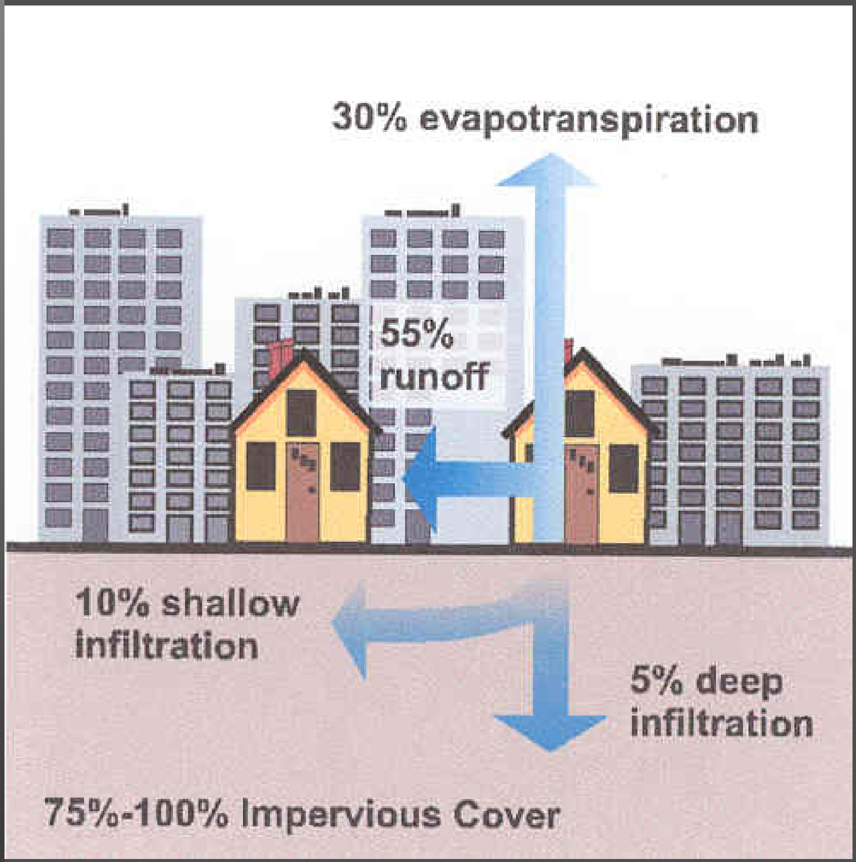
More than ¾ of the groundwater on the planet is considered nonrenewable- requiring more than a century to replenish naturally

Base river flow and renewable groundwater account for 27% of the world's runoff

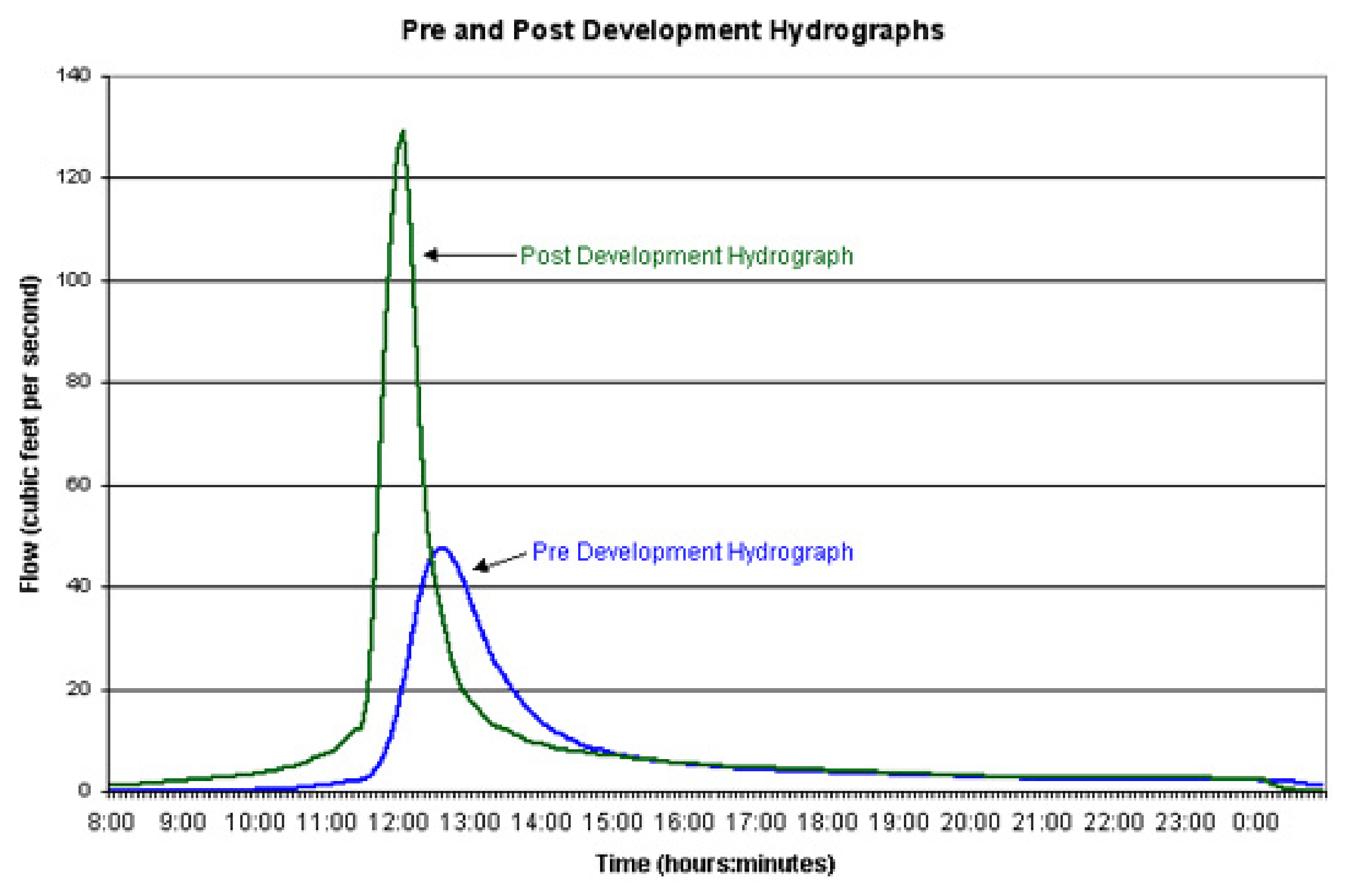


The Hydrologic Cycle





Stormwater Runoff



Flooding

Recent precipitation dropped 12 to 14 inches of rain in western MA and was close to the 100 year storm (7 inches in 24 hours)

Floods seen as a result were the 10 to 200 year floods

Estimates of the cost of repairing flood damage are still being made, but will likely run in the millions of dollars.

Beartown Brook, Stockbridge

Loss of Groundwater Recharge

American Rivers, the Natural Resources Defense Council, and Smart Growth America. 2002. Paving Our Way to Water Shortages: How Sprawl Aggravates the Effects of Drought.

1. Atlanta – 56.9 billion to 132.8 billion gallons;
2. Boston – 43.9 billion to 102.5 billion gallons;
3. Charlotte – 13.5 billion to 31.5 billion gallons;
4. Chicago – 10.2 billion to 23.7 billion gallons; and
5. Dallas – 6.2 billion to 14.4 billion gallons.

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Metropolitan Boston Water Use

Massachusetts Water Resources Authority

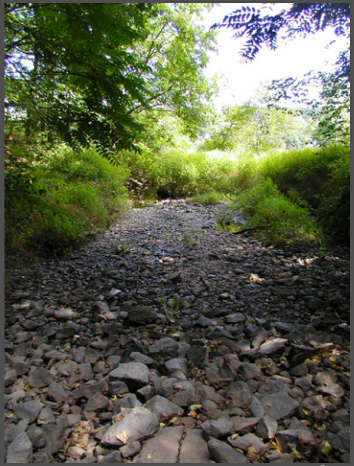
Boston – 84 billion gallons

Effects of depleted groundwater levels on rivers

Ipswich River

Neponset River
smelt spawning habitat

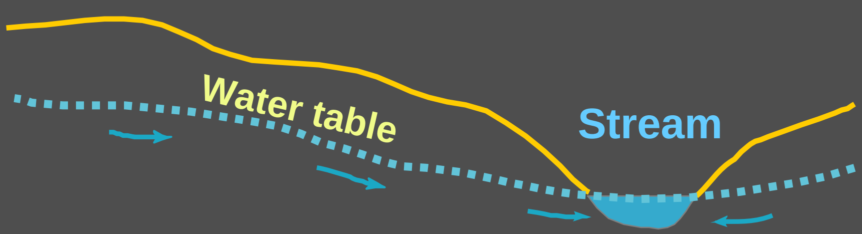
Fenton River
herring



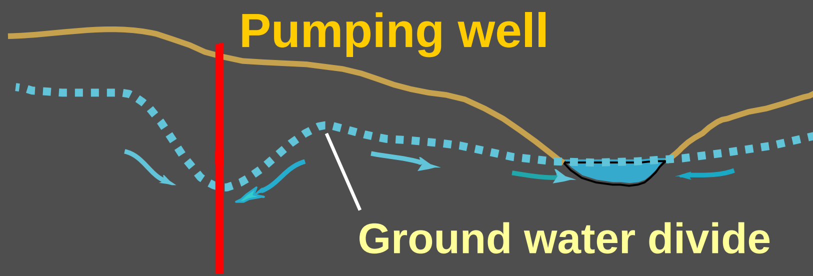
Poor Farm Brook
trout stream

Effects of pumping on streams…
(streamflow depletion)

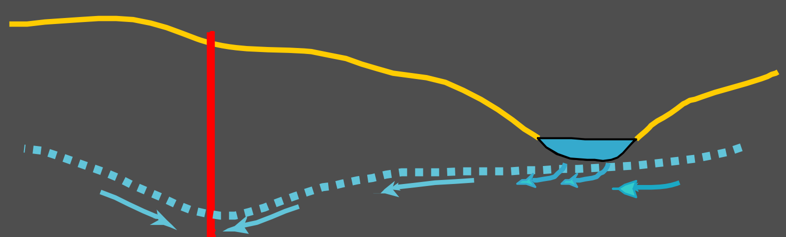
1. Pre-development



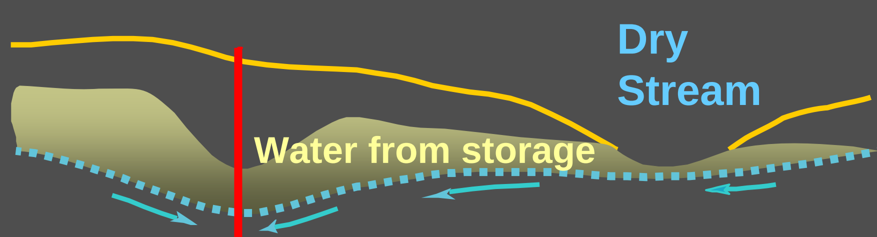
2. Captured recharge (or baseflow)



3. Induced infiltration



4. Depleted ground-water storage

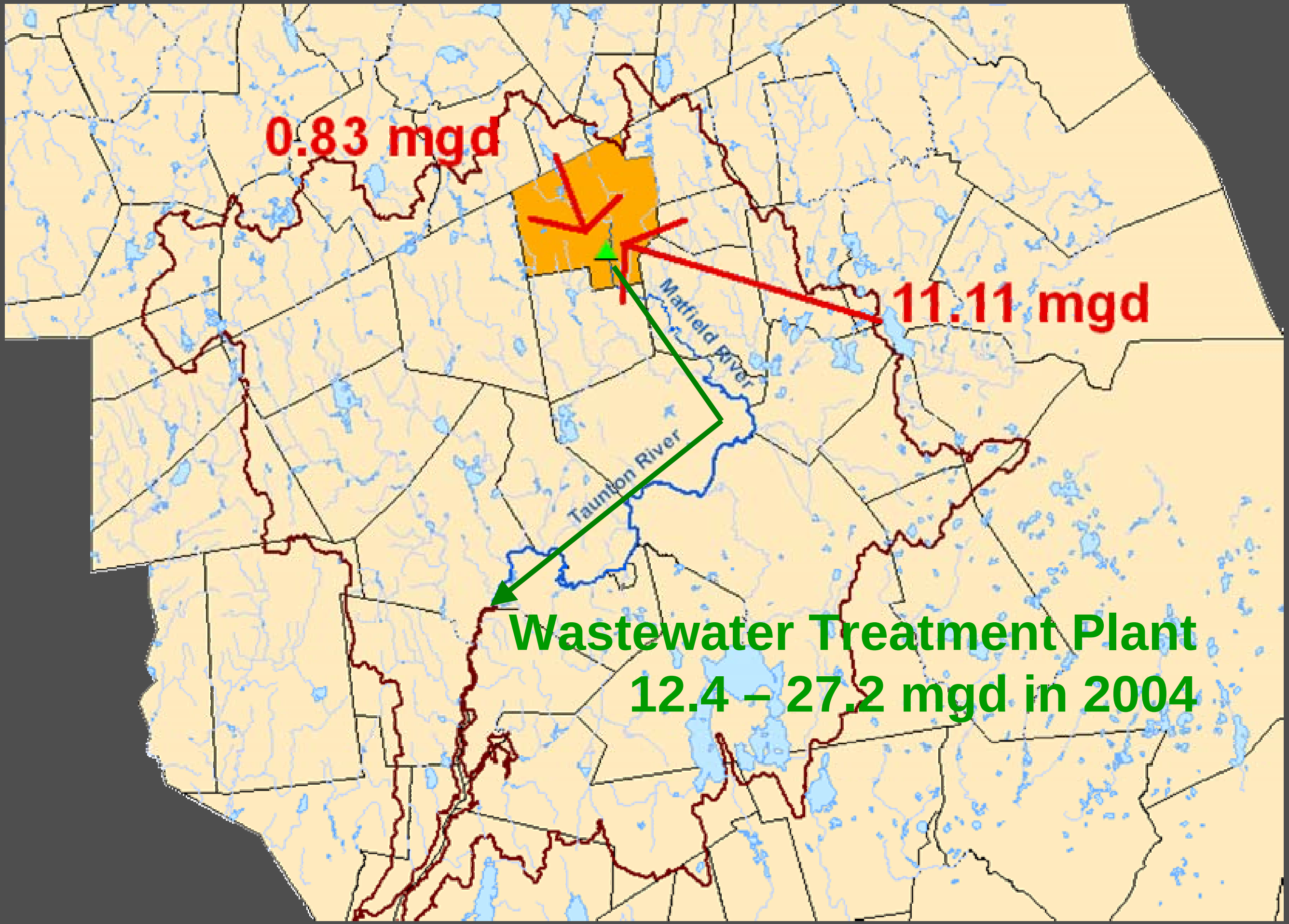


Slide courtesy of P. Zarriello and P. Weiskel

USGS
science for a changing world

Water Imbalance

Taunton River Watershed

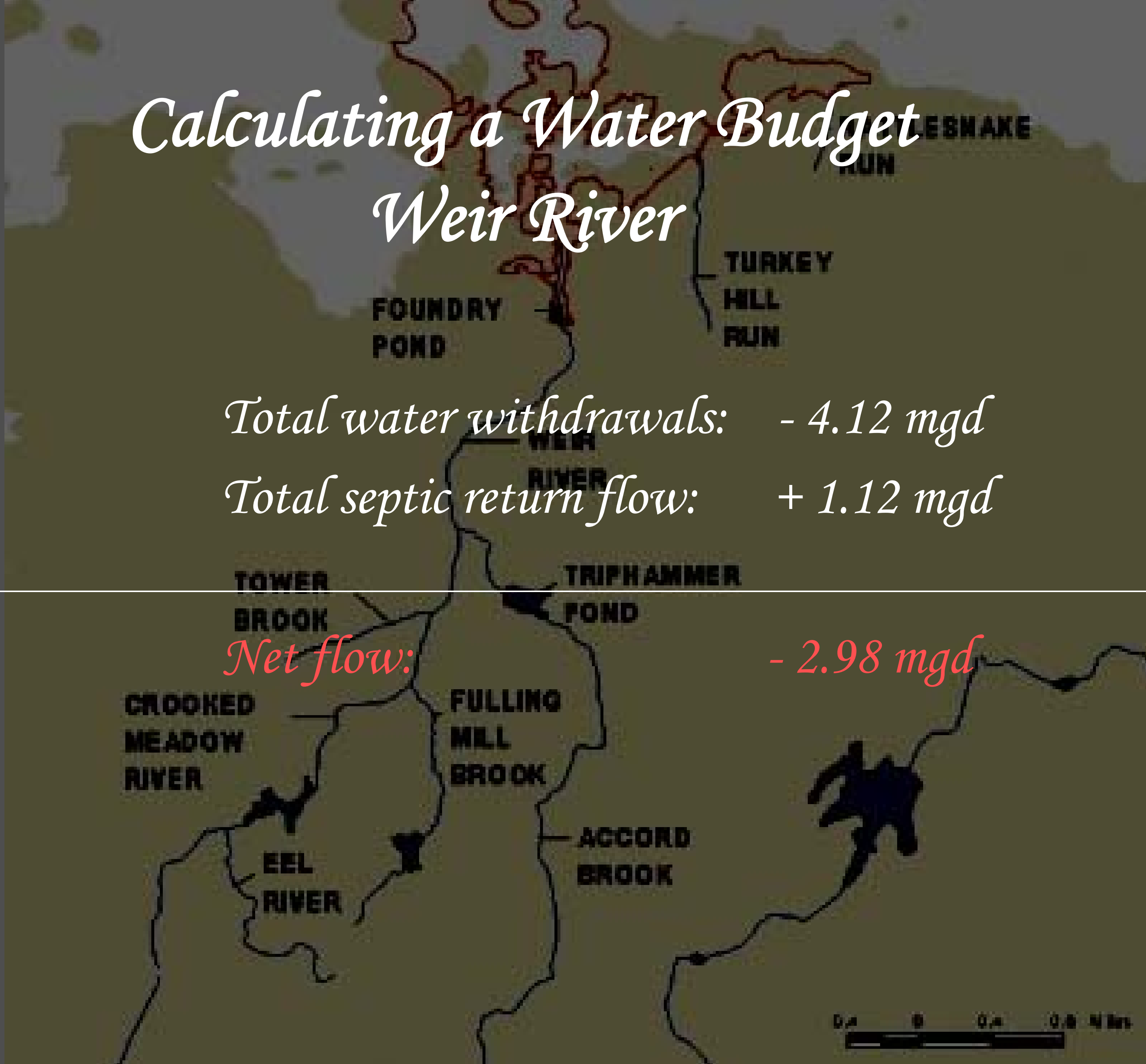


Calculating a Water Budget
Weir River

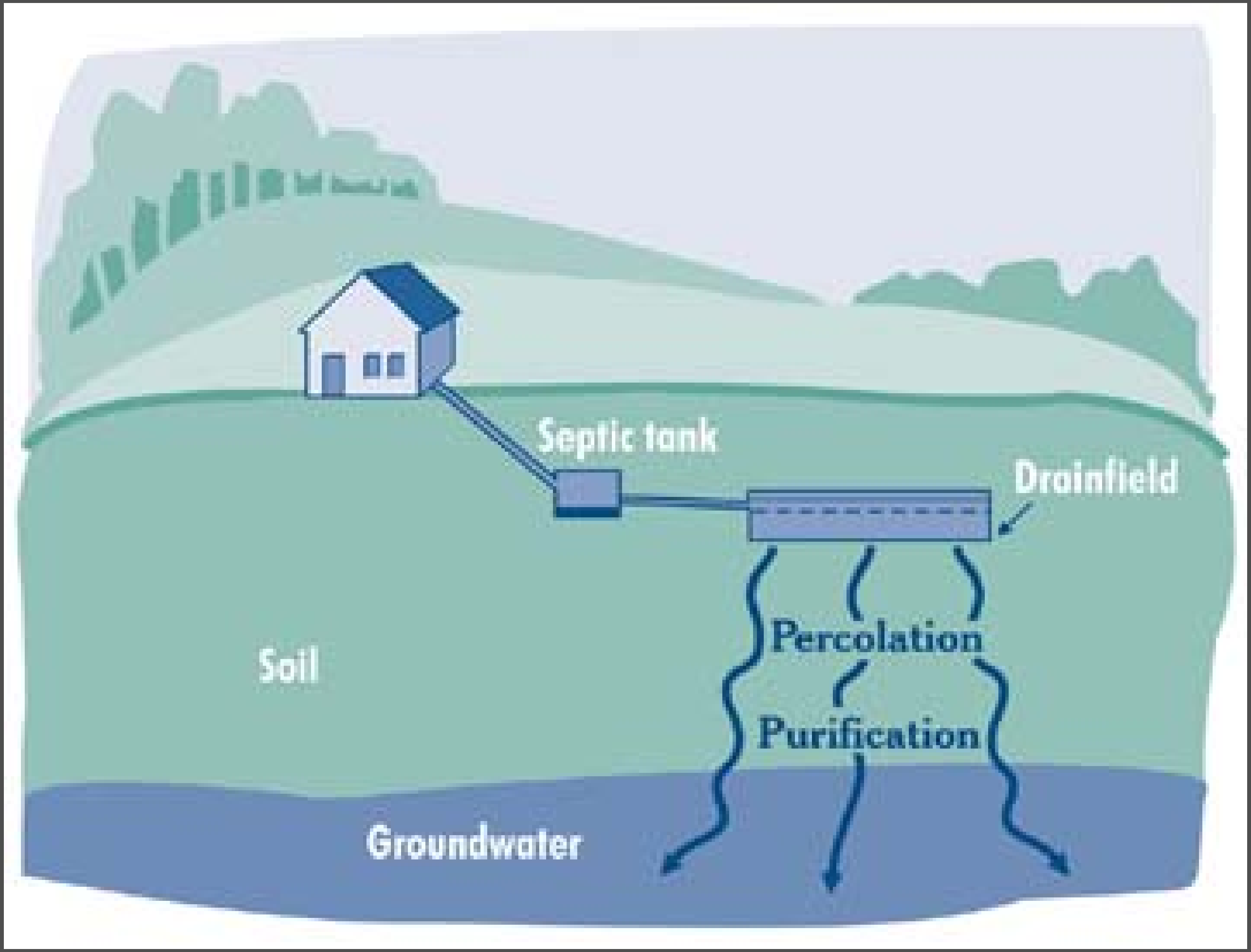
Total water withdrawals: *- 4.12 mgd*

Total septic return flow: *+ 1.12 mgd*

Net flow: *- 2.98 mgd*



Rebalancing the Water Budget



Rebalancing the Water Budget…
while protecting the environment

"Managed decentralized wastewater systems are viable, long term alternatives to centralized wastewater facilities … In some cases combinations of centralized and decentralized arrangements will be useful to solve diverse conditions."

EPA Response to Congress on use of Decentralized Wastewater Treatment Systems.

Increasing Cost of Centralized Services

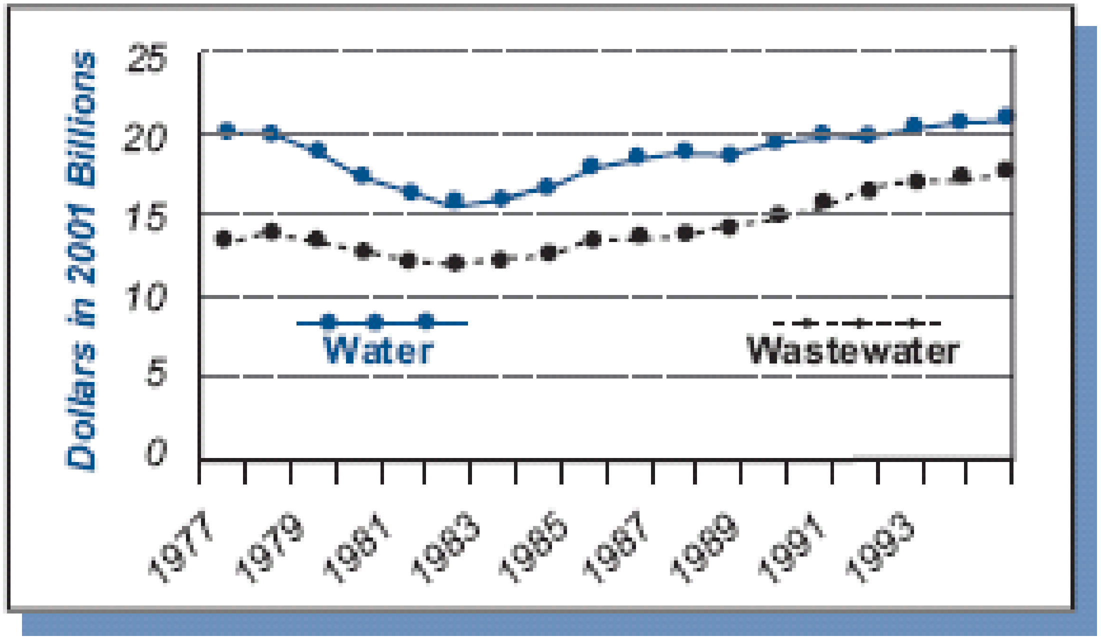


Figure 2–4: Operations and Maintenance Spending from State and Local Sources (1978–1994)

From: The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002

Cost for providing centralized water and wastewater to US communities is trending upward due to expansion and improvement in services and aging infrastructure, leading to <u>increasing capital and O&M costs.</u>

Cost of Doing Business

An interesting exercise is to consider where the money goes. In many instances it is the cost of moving the water/wastewater from Point A to Point B which requires the most resources.

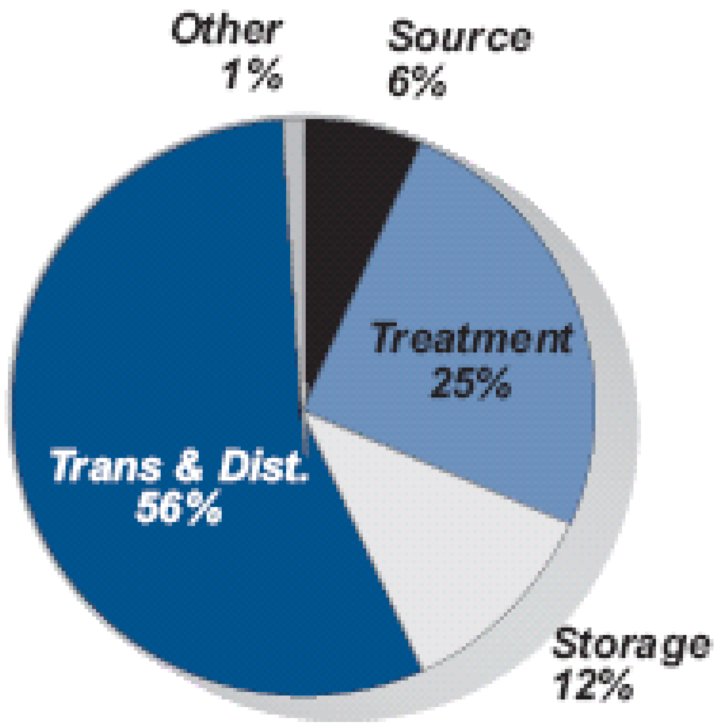


Figure 2–9: Percent Needs by Drinking Water Infrastructure Category (total needs $150.9 billion)

From: The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002

Fixing Problems is Costly

$11.6 BILLION estimated

was spent trying to correct infiltration and inflow problems. This figure does not include the costs accrued treating, storing and managing the I/I.

From: The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002

Operation & Maintenance Spending Gap

Wastewater: $72- 229 BILLION

Water: $0-495 BILLION

Over 20 year period, 2000 to 2019, using current spending & operation practices.

Note these numbers are VERY sensitive to energy costs

From: *The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002*

Overlooked Cost of Centralized Services

Table 2-1 - Useful Life Matrix

Years	Component
	Clean Water
80 - 100	Collections
50	Treatment Plants - Concrete Structures
15 - 25	Treatment Plants - Mechanical & Electrical
25	Force Mains
50	Pumping Stations - Concrete Structures
15	Pumping Stations - Mechanical & Electrical
90 - 100	Interceptors
	Drinking Water
50 - 80	Reservoirs & Dams
60 - 70	Treatment Plants - Concrete Structures
15 -25	Treatment Plants - Mechanical & Electrical
65 - 95	Trunk Mains
60 - 70	Pumping Stations - Concrete Structures
25	Pumping Stations - Mechanical & Electrical
65 - 95	Distribution

The useful life of water and wastewater infrastructure are markedly variable but all components eventually need to be replaced or upgraded.

From: The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002

Capital Needs $ Gap

Wastewater: $321-454 BILLION

Water: $178-475 BILLION

Wastewater capital demands are more likely to use debt instrument to cover costs.

From: The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA 2002

Holistic Planning

- *Keeps water local when possible*
- *Minimizes infrastructure and associated costs*
- *Sustains natural resources*
- *Helps communities plan for sustainable development*

Alewife migrating up the Nemakset River
Photo courtesy of Tim Watts